

<110> Zimmerman, et al.
 <120> M-CSF MUTEINS AND USES THEREOF
 <130> PP021603.0002
 <140> To be assigned
 <141> 2005-01-21
 <150> US 60/537,985
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 Met Thr Ala Pro Gly Ala Ala Gly Arg Cys Pro Pro Thr Thr
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 Trp Leu Gly Ser Leu Leu Leu Leu Val Cys Leu Leu Ala Ser Arg Ser
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 atc acc gag gag gtg tcg gag tac tgt agc cac atg att ggg agt gga 327
 Ile Thr Glu Glu Val Ser Glu Tyr Cys Ser His Met Ile Gly Ser Gly
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 cac ctg cag tct ctg cag cgg ctg att gac agt cag atg gag acc tcg 375
 His Leu Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser
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 tgc caa att aca ttt gag ttt gta gac cag gaa cag ttg aaa gat cca 423
 Cys Gln Ile Thr Phe Glu Phe Val Asp Gln Glu Gln Lys Asp Pro
 65 70 75

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| gtg tgc tac ctt aag aag gca ttt ctc ctg gta caa gac ata atg gag Val Cys Tyr Leu Lys Lys Ala Phe Leu Leu Val Gln Asp Ile Met Glu 80 85 90 | 471 |
| gac acc atg cgc ttc aga gat aac acc ccc aat gcc atc gcc att gtg Asp Thr Met Arg Phe Arg Asp Asn Thr Pro Asn Ala Ile Ala Ile Val 95 100 105 110 | 519 |
| cag ctg cag gaa ctc tct ttg agg ctg aag agc tgc ttc acc aag gat Gln Leu Gln Glu Leu Ser Leu Arg Leu Lys Ser Cys Phe Thr Lys Asp 115 120 125 | 567 |
| tat gaa gag cat gac aag gcc tgc gtc cga act ttc tat gag aca cct Tyr Glu Glu His Asp Lys Ala Cys Val Arg Thr Phe Tyr Glu Thr Pro 130 135 140 | 615 |
| ctc cag ttg ctg gag aag gtc aag aat gtc ttt aat gaa aca aag aat Leu Gln Leu Leu Glu Lys Val Lys Asn Val Phe Asn Glu Thr Lys Asn 145 150 155 | 663 |
| ctc ctt gac aag gac tgg aat att ttc agc aag aac tgc aac aac agc Leu Leu Asp Lys Asp Trp Asn Ile Phe Ser Lys Asn Cys Asn Asn Ser 160 165 170 | 711 |
| ttt gct gaa tgc tcc agc caa ggc cat gag agg cag tcc gag gga tcc Phe Ala Glu Cys Ser Ser Gln Gly His Glu Arg Gln Ser Glu Gly Ser 175 180 185 190 | 759 |
| tcc agc ccg cag ctc cag gag tct gtc ttc cac ctg ctg gtg ccc agt Ser Ser Pro Gln Leu Gln Glu Ser Val Phe His Leu Leu Val Pro Ser 195 200 205 | 807 |
| gtc atc ctg gtc ttg ctg gcc gtc gga ggc ctc ttg ttc tac agg tgg Val Ile Leu Val Leu Leu Ala Val Gly Gly Leu Leu Phe Tyr Arg Trp 210 215 220 | 855 |
| agg cgg cgg agc cat caa gag cct cag aga gcg gat tct ccc ttg gag Arg Arg Arg Ser His Gln Glu Pro Gln Arg Ala Asp Ser Pro Leu Glu 225 230 235 | 903 |
| caa cca gag ggc agc ccc ctg act cag gat gac aga cag gtg gaa ctg Gln Pro Glu Gly Ser Pro Leu Thr Gln Asp Asp Arg Gln Val Glu Leu 240 245 250 | 951 |
| cca gtg tag agggaattct aagctggacg cacagaacag tctctccgtg Pro Val 255 | 1000 |
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| tgaaagaacc ctgcacccag agggcctgcc tgggtgccaag gtatcccagc ctggacaggc | 1420 |
| atggacctgt ctccagagag aggagcctga agttcgtggg gcgggacagc gtcggcctga | 1480 |

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Glu Glu Val Ser Glu Tyr Cys Ser His Met Ile Gly Ser Gly His Leu
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Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser Cys Gln
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Ile Thr Phe Glu Phe Val Asp Gln Glu Gln Leu Lys Asp Pro Val Cys
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Tyr Leu Lys Lys Ala Phe Leu Leu Val Gln Asp Ile Met Glu Asp Thr
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Met Arg Phe Arg Asp Asn Thr Pro Asn Ala Ile Ala Ile Val Gln Leu
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Gln Glu Leu Ser Leu Arg Leu Lys Ser Cys Phe Thr Lys Asp Tyr Glu
115         120         125

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Glu His Asp Lys Ala Cys Val Arg Thr Phe Tyr Glu Thr Pro Leu Gln
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Leu Leu Glu Lys Val Lys Asn Val Phe Asn Glu Thr Lys Asn Leu Leu
145         150         155         160

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Asp Lys Asp Trp Asn Ile Phe Ser Lys Asn Cys Asn Asn Ser Phe Ala

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| | | | |
|--------------------------------------------------------------------|-----|-----|-----|
| 165 | 170 | 175 | |
| Glu Cys Ser Ser Gln Gly His Glu Arg Gln Ser Glu Gly Ser Ser Ser | | | |
| 180 | 185 | 190 | |
| Pro Gln Leu Gln Glu Ser Val Phe His Leu Leu Val Pro Ser Val Ile | | | |
| 195 | 200 | 205 | |
| Leu Val Leu Leu Ala Val Gly Gly Leu Leu Phe Tyr Arg Trp Arg Arg | | | |
| 210 | 215 | 220 | |
| Arg Ser His Gln Glu Pro Gln Arg Ala Asp Ser Pro Leu Glu Gln Pro | | | |
| 225 | 230 | 235 | 240 |
| Glu Gly Ser Pro Leu Thr Gln Asp Asp Arg Gln Val Glu Leu Pro Val | | | |
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| gccagagccg ctctccgcat cccaggacag cgggtgcggcc ctcggccggg gcgcccactc | | | 120 |
| cgcagcagcc agcgagcgag cgagcgagcg agggcgggccg acgcgcccgg ccgggaccca | | | 180 |
| gctgcccgt atg acc gcg ccg ggc gcc gcc ggg cgc tgc cct ccc acg aca | | | 231 |
| 1 | 5 | 10 | |
| Met Thr Ala Pro Gly Ala Ala Gly Arg Cys Pro Pro Thr Thr | | | |
| | | | |
| tgg ctg ggc tcc ctg ctg ttg ttg gtc tgt ctc ctg gcg agc agg agt | | | 279 |
| 15 | 20 | 25 | 30 |
| Trp Leu Gly Ser Leu Leu Leu Val Cys Leu Leu Ala Ser Arg Ser | | | |
| | | | |
| atc acc gag gag gtg tcg gag tac tgt agc cac atg att ggg agt gga | | | 327 |
| 35 | 40 | 45 | |
| Ile Thr Glu Glu Val Ser Glu Tyr Cys Ser His Met Ile Gly Ser Gly | | | |
| | | | |
| cac ctg cag tct ctg cag cgg ctg att gac agt cag atg gag acc tcg | | | 375 |
| 50 | 55 | 60 | |
| His Leu Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| tgc | caa | att | aca | ttt | gag | ttt | gta | gac | cag | gaa | cag | ttg | aaa | gat | cca | 423 |
| Cys | Gln | Ile | Thr | Phe | Glu | Phe | Val | Asp | Gln | Glu | Gln | Leu | Lys | Asp | Pro | |
| | 65 | | | | | | 70 | | | | | 75 | | | | |
| gtg | tgc | tac | ctt | aag | aag | gca | ttt | ctc | ctg | gta | caa | gac | ata | atg | gag | 471 |
| Val | Cys | Tyr | Leu | Lys | Lys | Ala | Phe | Leu | Leu | Val | Gln | Asp | Ile | Met | Glu | |
| | 80 | | | | | 85 | | | | | 90 | | | | | |
| gac | acc | atg | cgc | ttc | aga | gat | aac | acc | ccc | aat | gcc | atc | gcc | att | gtg | 519 |
| Asp | Thr | Met | Arg | Phe | Arg | Asp | Asn | Thr | Pro | Asn | Ala | Ile | Ala | Ile | Val | |
| 95 | | | | | 100 | | | | | 105 | | | | | 110 | |
| cag | ctg | cag | gaa | ctc | tct | ttg | agg | ctg | aag | agc | tgc | ttc | acc | aag | gat | 567 |
| Gln | Leu | Gln | Glu | Leu | Ser | Leu | Arg | Leu | Lys | Ser | Cys | Phe | Thr | Lys | Asp | |
| | | | | 115 | | | | | 120 | | | | | 125 | | |
| tat | gaa | gag | cat | gac | aag | gcc | tgc | gtc | cga | act | ttc | tat | gag | aca | cct | 615 |
| Tyr | Glu | Glu | His | Asp | Lys | Ala | Cys | Val | Arg | Thr | Phe | Tyr | Glu | Thr | Pro | |
| | | | 130 | | | | | 135 | | | | | 140 | | | |
| ctc | cag | ttg | ctg | gag | aag | gtc | aag | aat | gtc | ttt | aat | gaa | aca | aag | aat | 663 |
| Leu | Gln | Leu | Leu | Glu | Lys | Val | Lys | Asn | Val | Phe | Asn | Glu | Thr | Lys | Asn | |
| | | 145 | | | | | 150 | | | | | 155 | | | | |
| ctc | ctt | gac | aag | gac | tgg | aat | att | ttc | agc | aag | aac | tgc | aac | aac | agc | 711 |
| Leu | Leu | Asp | Lys | Asp | Trp | Asn | Ile | Phe | Ser | Lys | Asn | Cys | Asn | Asn | Ser | |
| | 160 | | | | | 165 | | | | | 170 | | | | | |
| ttt | gct | gaa | tgc | tcc | agc | caa | gat | gtg | gtg | acc | aag | cct | gat | tgc | aac | 759 |
| Phe | Ala | Glu | Cys | Ser | Ser | Gln | Asp | Val | Val | Thr | Lys | Pro | Asp | Cys | Asn | |
| 175 | | | | | 180 | | | | | 185 | | | | | 190 | |
| tgc | ctg | tac | ccc | aaa | gcc | atc | cct | agc | agt | gac | ccg | gcc | tct | gtc | tcc | 807 |
| Cys | Leu | Tyr | Pro | Lys | Ala | Ile | Pro | Ser | Ser | Asp | Pro | Ala | Ser | Val | Ser | |
| | | | | 195 | | | | 200 | | | | | | 205 | | |
| cct | cat | cag | ccc | ctc | gcc | ccc | tcc | atg | gcc | cct | gtg | gct | ggc | ttg | acc | 855 |
| Pro | His | Gln | Pro | Leu | Ala | Pro | Ser | Met | Ala | Pro | Val | Ala | Gly | Leu | Thr | |
| | | | 210 | | | | | 215 | | | | | 220 | | | |
| tgg | gag | gac | tct | gag | gga | act | gag | ggc | agc | tcc | ctc | ttg | cct | ggg | gag | 903 |
| Trp | Glu | Asp | Ser | Glu | Gly | Thr | Glu | Gly | Ser | Ser | Leu | Leu | Pro | Gly | Glu | |
| | 225 | | | | | | 230 | | | | | 235 | | | | |
| cag | ccc | ctg | cac | aca | gtg | gat | cca | ggc | agt | gcc | aag | cag | cgg | cca | ccc | 951 |
| Gln | Pro | Leu | His | Thr | Val | Asp | Pro | Gly | Ser | Ala | Lys | Gln | Arg | Pro | Pro | |
| | 240 | | | | | 245 | | | | | 250 | | | | | |
| agg | agc | acc | tgc | cag | agc | ttt | gag | ccg | cca | gag | acc | cca | gtt | gtc | aag | 999 |
| Arg | Ser | Thr | Cys | Gln | Ser | Phe | Glu | Pro | Pro | Glu | Thr | Pro | Val | Val | Lys | |
| 255 | | | | | 260 | | | | | 265 | | | | | 270 | |
| gac | agc | acc | atc | ggg | ggc | tca | cca | cag | cct | cgc | ccc | tct | gtc | ggg | gcc | 1047 |
| Asp | Ser | Thr | Ile | Gly | Gly | Ser | Pro | Gln | Pro | Arg | Pro | Ser | Val | Gly | Ala | |
| | | | | 275 | | | | | 280 | | | | | 285 | | |
| ttc | aac | ccc | ggg | atg | gag | gat | att | ctt | gac | tct | gca | atg | ggc | act | aat | 1095 |
| Phe | Asn | Pro | Gly | Met | Glu | Asp | Ile | Leu | Asp | Ser | Ala | Met | Gly | Thr | Asn | |
| | | | 290 | | | | | 295 | | | | | 300 | | | |
| tgg | gtc | cca | gaa | gaa | gcc | tct | gga | gag | gcc | agt | gag | att | ccc | gta | ccc | 1143 |
| Trp | Val | Pro | Glu | Glu | Ala | Ser | Gly | Glu | Ala | Ser | Glu | Ile | Pro | Val | Pro | |
| | | 305 | | | | | 310 | | | | | 315 | | | | |

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| caa ggg aca gag ctt tcc ccc tcc agg cca gga ggg ggc agc atg cag Gln Gly Thr Glu Leu Ser Pro Ser Arg Pro Gly Gly Gly Ser Met Gln 320 325 330 | 1191 |
| aca gag ccc gcc aga ccc agc aac ttc ctc tca gca tct tct cca ctc Thr Glu Pro Ala Arg Pro Ser Asn Phe Leu Ser Ala Ser Ser Pro Leu 335 340 345 350 | 1239 |
| cct gca tca gca aag ggc caa cag ccg gca gat gta act ggt aca gcc Pro Ala Ser Ala Lys Gly Gln Gln Pro Ala Asp Val Thr Gly Thr Ala 355 360 365 | 1287 |
| ttg ccc agg gtg ggc ccc gtg agg ccc act ggc cag gac tgg aat cac Leu Pro Arg Val Gly Pro Val Arg Pro Thr Gly Gln Asp Trp Asn His 370 375 380 | 1335 |
| acc ccc cag aag aca gac cat cca tct gcc ctg ctc aga gac ccc ccg Thr Pro Gln Lys Thr Asp His Pro Ser Ala Leu Leu Arg Asp Pro Pro 385 390 395 | 1383 |
| gag cca ggc tct ccc agg atc tca tca ctg cgc ccc cag ggc ctc agc Glu Pro Gly Ser Pro Arg Ile Ser Ser Leu Arg Pro Gln Gly Leu Ser 400 405 410 | 1431 |
| aac ccc tcc acc ctc tct gct cag cca cag ctt tcc aga agc cac tcc Asn Pro Ser Thr Leu Ser Ala Gln Pro Gln Leu Ser Arg Ser His Ser 415 420 425 430 | 1479 |
| tcg ggc agc gtg ctg ccc ctt ggg gag ctg gag ggc agg agg agc acc Ser Gly Ser Val Leu Pro Leu Gly Glu Leu Glu Gly Arg Arg Ser Thr 435 440 445 | 1527 |
| agg gat cgg agg agc ccc gca gag cca gaa gga gga cca gca agt gaa Arg Asp Arg Arg Ser Pro Ala Glu Glu Gly Gly Pro Ala Ser Glu 450 455 460 | 1575 |
| ggg gca gcc agg ccc ctg ccc cgt ttt aac tcc gtt cct ttg act gac Gly Ala Ala Arg Pro Leu Pro Arg Phe Asn Ser Val Pro Leu Thr Asp 465 470 475 | 1623 |
| aca ggc cat gag agg cag tcc gag gga tcc tcc agc ccg cag ctc cag Thr Gly His Glu Arg Gln Ser Glu Gly Ser Ser Ser Pro Gln Leu Gln 480 485 490 | 1671 |
| gag tct gtc ttc cac ctg ctg gtg ccc agt gtc atc ctg gtc ttg ctg Glu Ser Val Phe His Leu Leu Val Pro Ser Val Ile Leu Val Leu Leu 495 500 505 510 | 1719 |
| gcc gtc gga ggc ctc ttg ttc tac agg tgg agg cgg cgg agc cat caa Ala Val Gly Gly Leu Leu Phe Tyr Arg Trp Arg Arg Arg Ser His Gln 515 520 525 | 1767 |
| gag cct cag aga gcg gat tct ccc ttg gag caa cca gag ggc agc ccc Glu Pro Gln Arg Ala Asp Ser Pro Leu Glu Gln Pro Glu Gly Ser Pro 530 535 540 | 1815 |
| ctg act cag gat gac aga cag gtg gaa ctg cca gtg tag aggggaattct Leu Thr Gln Asp Asp Arg Gln Val Glu Leu Pro Val 545 550 | 1864 |
| aagctggacg cacagaacag tctctccgtg ggaggagaca ttatggggcg tccaccacca | 1924 |
| cccctccctg gccatcctcc tggaatgtgg tctgccctcc accagagctc ctgcctgcc | 1984 |

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          20          25          30

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Glu Glu Val Ser Glu Tyr Cys Ser His Met Ile Gly Ser Gly His Leu
35          40          45

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Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser Cys Gln
50          55          60

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Ile Thr Phe Glu Phe Val Asp Gln Glu Gln Leu Lys Asp Pro Val Cys
65          70          75          80

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Tyr Leu Lys Lys Ala Phe Leu Leu Val Gln Asp Ile Met Glu Asp Thr
          85          90          95

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Met Arg Phe Arg Asp Asn Thr Pro Asn Ala Ile Ala Ile Val Gln Leu
          100          105          110

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Gln Glu Leu Ser Leu Arg Leu Lys Ser Cys Phe Thr Lys Asp Tyr Glu

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| Leu Leu Glu Lys Val Lys Asn Val Phe Asn Glu Thr Lys Asn Leu Leu 145 150 155 160 | | |
| Asp Lys Asp Trp Asn Ile Phe Ser Lys Asn Cys Asn Asn Ser Phe Ala 165 170 175 | | |
| Glu Cys Ser Ser Gln Asp Val Val Thr Lys Pro Asp Cys Asn Cys Leu 180 185 190 | | |
| Tyr Pro Lys Ala Ile Pro Ser Ser Asp Pro Ala Ser Val Ser Pro His 195 200 205 | | |
| Gln Pro Leu Ala Pro Ser Met Ala Pro Val Ala Gly Leu Thr Trp Glu 210 215 220 | | |
| Asp Ser Glu Gly Thr Glu Gly Ser Ser Leu Leu Pro Gly Glu Gln Pro 225 230 235 240 | | |
| Leu His Thr Val Asp Pro Gly Ser Ala Lys Gln Arg Pro Pro Arg Ser 245 250 255 | | |
| Thr Cys Gln Ser Phe Glu Pro Pro Glu Thr Pro Val Val Lys Asp Ser 260 265 270 | | |
| Thr Ile Gly Gly Ser Pro Gln Pro Arg Pro Ser Val Gly Ala Phe Asn 275 280 285 | | |
| Pro Gly Met Glu Asp Ile Leu Asp Ser Ala Met Gly Thr Asn Trp Val 290 295 300 | | |
| Pro Glu Glu Ala Ser Gly Glu Ala Ser Glu Ile Pro Val Pro Gln Gly 305 310 315 320 | | |
| Thr Glu Leu Ser Pro Ser Arg Pro Gly Gly Gly Ser Met Gln Thr Glu 325 330 335 | | |
| Pro Ala Arg Pro Ser Asn Phe Leu Ser Ala Ser Ser Pro Leu Pro Ala 340 345 350 | | |
| Ser Ala Lys Gly Gln Gln Pro Ala Asp Val Thr Gly Thr Ala Leu Pro 355 360 365 | | |

Arg Val Gly Pro Val Arg Pro Thr Gly Gln Asp Trp Asn His Thr Pro
370 375 380

Gln Lys Thr Asp His Pro Ser Ala Leu Leu Arg Asp Pro Pro Glu Pro
385 390 395 400

Gly Ser Pro Arg Ile Ser Ser Leu Arg Pro Gln Gly Leu Ser Asn Pro
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Ser Thr Leu Ser Ala Gln Pro Gln Leu Ser Arg Ser His Ser Ser Gly
420 425 430

Ser Val Leu Pro Leu Gly Glu Leu Glu Gly Arg Arg Ser Thr Arg Asp
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Arg Arg Ser Pro Ala Glu Pro Glu Gly Gly Pro Ala Ser Glu Gly Ala
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Ala Arg Pro Leu Pro Arg Phe Asn Ser Val Pro Leu Thr Asp Thr Gly
465 470 475 480

His Glu Arg Gln Ser Glu Gly Ser Ser Ser Pro Gln Leu Gln Glu Ser
485 490 495

Val Phe His Leu Leu Val Pro Ser Val Ile Leu Val Leu Leu Ala Val
500 505 510

Gly Gly Leu Leu Phe Tyr Arg Trp Arg Arg Arg Ser His Gln Glu Pro
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| gctgcccgt atg acc gcg ccg ggc gcc gcc ggg cgc tgc cct ccc acg aca | 231 |
| Met Thr Ala Pro Gly Ala Ala Gly Arg Cys Pro Pro Thr Thr | |
| 1 5 10 | |
| tggtgg ctg ggc tcc ctg ctg ttg ttg gtc tgt ctc ctg gcg agc agg agt | 279 |
| Trp Leu Gly Ser Leu Leu Leu Val Cys Leu Leu Ala Ser Arg Ser | |
| 15 20 25 30 | |
| atc acc gag gag gtg tgc gag tac tgt agc cac atg att ggg agt gga | 327 |
| Ile Thr Glu Glu Val Ser Glu Tyr Cys Ser His Met Ile Gly Ser Gly | |
| 35 40 45 | |
| cac ctg cag tct ctg cag cgg ctg att gac agt cag atg gag acc tgc | 375 |
| His Leu Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser | |
| 50 55 60 | |
| tgc caa att aca ttt gag ttt gta gac cag gaa cag ttg aaa gat cca | 423 |
| Cys Gln Ile Thr Phe Glu Phe Val Asp Gln Glu Gln Leu Lys Asp Pro | |
| 65 70 75 | |
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| Val Cys Tyr Leu Lys Lys Ala Phe Leu Leu Val Gln Asp Ile Met Glu | |
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| Asp Thr Met Arg Phe Arg Asp Asn Thr Pro Asn Ala Ile Ala Ile Val | |
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| cag ctg cag gaa ctc tct ttg agg ctg aag agc tgc ttc acc aag gat | 567 |
| Gln Leu Gln Glu Leu Ser Leu Arg Leu Lys Ser Cys Phe Thr Lys Asp | |
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| Tyr Glu Glu His Asp Lys Ala Cys Val Arg Thr Phe Tyr Glu Thr Pro | |
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| ctc cag ttg ctg gag aag gtc aag aat gtc ttt aat gaa aca aag aat | 663 |
| Leu Gln Leu Leu Glu Lys Val Lys Asn Val Phe Asn Glu Thr Lys Asn | |
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| Leu Leu Asp Lys Asp Trp Asn Ile Phe Ser Lys Asn Cys Asn Asn Ser | |
| 160 165 170 | |
| ttt gct gaa tgc tcc agc caa gat gtg gtg acc aag cct gat tgc aac | 759 |
| Phe Ala Glu Cys Ser Ser Gln Asp Val Val Thr Lys Pro Asp Cys Asn | |
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| tgc ctg tac ccc aaa gcc atc cct agc agt gac ccg gcc tct gtc tcc | 807 |
| Cys Leu Tyr Pro Lys Ala Ile Pro Ser Ser Asp Pro Ala Ser Val Ser | |
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| Trp | Glu | Asp | Ser | Glu | Gly | Thr | Glu | Gly | Ser | Ser | Leu | Leu | Pro | Gly | Glu | | | |
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| Gln | Pro | Leu | His | Thr | Val | Asp | Pro | Gly | Ser | Ala | Lys | Gln | Arg | Pro | Pro | | | |
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| Asp | Ser | Thr | Ile | Gly | Gly | Ser | Pro | Gln | Pro | Arg | Pro | Ser | Val | Gly | Ala | | | |
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| ttc | aac | ccc | ggg | atg | gag | gat | att | ctt | gac | tct | gca | atg | ggc | act | aat | 1095 | | |
| Phe | Asn | Pro | Gly | Met | Glu | Asp | Ile | Leu | Asp | Ser | Ala | Met | Gly | Thr | Asn | | | |
| | | | 290 | | | | | 295 | | | | | 300 | | | | | |
| tgg | gtc | cca | gaa | gaa | gcc | tct | gga | gag | gcc | agt | gag | att | ccc | gta | ccc | 1143 | | |
| Trp | Val | Pro | Glu | Glu | Ala | Ser | Gly | Glu | Ala | Ser | Glu | Ile | Pro | Val | Pro | | | |
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| Thr | Glu | Pro | Ala | Arg | Pro | Ser | Asn | Phe | Leu | Ser | Ala | Ser | Ser | Pro | Leu | | | |
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| Leu | Leu | Phe | Tyr | Arg | Trp | Arg | Arg | Arg | Ser | His | Gln | Glu | Pro | Gln | Arg | | | |
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| Ala | Asp | Ser | Pro | Leu | Glu | Gln | Pro | Glu | Gly | Ser | Pro | Leu | Thr | Gln | Asp | | | |
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Gln Ser Leu Gln Arg Leu Ile Asp Ser Gln Met Glu Thr Ser Cys Gln
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Ile Thr Phe Glu Phe Val Asp Gln Glu Gln Leu Lys Asp Pro Val Cys
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Tyr Leu Lys Lys Ala Phe Leu Leu Val Gln Asp Ile Met Glu Asp Thr
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Met Arg Phe Arg Asp Asn Thr Pro Asn Ala Ile Ala Ile Val Gln Leu
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Gln Glu Leu Ser Leu Arg Leu Lys Ser Cys Phe Thr Lys Asp Tyr Glu
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Glu His Asp Lys Ala Cys Val Arg Thr Phe Tyr Glu Thr Pro Leu Gln
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Leu Leu Glu Lys Val Lys Asn Val Phe Asn Glu Thr Lys Asn Leu Leu
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Asp Lys Asp Trp Asn Ile Phe Ser Lys Asn Cys Asn Asn Ser Phe Ala
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Glu Cys Ser Ser Gln Asp Val Val Thr Lys Pro Asp Cys Asn Cys Leu
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Tyr Pro Lys Ala Ile Pro Ser Ser Asp Pro Ala Ser Val Ser Pro His
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Gln Pro Leu Ala Pro Ser Met Ala Pro Val Ala Gly Leu Thr Trp Glu
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Pro Gly Val Leu Leu Leu Leu Leu Val Ala Thr Ala Trp His Gly Gln
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Gly Ile Pro Val Ile Glu Pro Ser Val Pro Glu Leu Val Val Lys Pro
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Gly Ala Thr Val Thr Leu Arg Cys Val Gly Asn Gly Ser Val Glu Trp
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Ser Ile Leu Ser Thr Asn Asn Ala Thr Phe Gln Asn Thr Gly Thr Tyr
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Arg Cys Thr Glu Pro Gly Asp Pro Leu Gly Gly Ser Ala Ala Ile His
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ctc tat gtc aaa gac cct gcc cgg ccc tgg aac gtg cta gca cag gag      634
Leu Tyr Val Lys Asp Pro Ala Arg Pro Trp Asn Val Leu Ala Gln Glu
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| Asp | Asp | Pro | Tyr | Pro | Glu | Val | Leu | Ser | Gln | Glu | Pro | Phe | His | Lys | Val | | | | | |
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| Thr | Val | Gln | Ser | Leu | Leu | Thr | Val | Glu | Thr | Leu | Glu | His | Asn | Gln | Thr | | | | | |
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| Tyr | Glu | Cys | Arg | Ala | His | Asn | Ser | Val | Gly | Ser | Gly | Ser | Trp | Ala | Phe | | | | | |
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| Lys | Val | Val | Glu | Ala | Thr | Ala | Phe | Gly | Leu | Gly | Lys | Glu | Asp | Ala | Val | | | | | |
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| | | | | | | | | | | | | | | | | |
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| Lys | Glu | Ala | Leu | Met | Ser | Glu | Leu | Lys | Ile | Met | Ser | His | Leu | Gly | Gln | |
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| acc | aat | ggg | cat | gtg | gcc | aag | att | ggg | gac | ttc | ggg | ctg | gct | agg | gac | 2698 |
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| Ile | Met | Asn | Asp | Ser | Asn | Tyr | Ile | Val | Lys | Gly | Asn | Ala | Arg | Leu | Pro | |
| | | 805 | | | | | 810 | | | | | 815 | | | | |
| gtg | aag | tgg | atg | gcc | cca | gag | agc | atc | ttt | gac | tgt | gtc | tac | acg | gtt | 2794 |
| Val | Lys | Trp | Met | Ala | Pro | Glu | Ser | Ile | Phe | Asp | Cys | Val | Tyr | Thr | Val | |
| | 820 | | | | | 825 | | | | | 830 | | | | | |
| cag | agc | gac | gtc | tgg | tcc | tat | ggc | atc | ctc | ctc | tgg | gag | atc | ttc | tca | 2842 |
| Gln | Ser | Asp | Val | Trp | Ser | Tyr | Gly | Ile | Leu | Leu | Trp | Glu | Ile | Phe | Ser | |
| 835 | | | | | 840 | | | | | 845 | | | | | 850 | |
| ctt | ggg | ctg | aat | ccc | tac | cct | ggc | atc | ctg | gtg | aac | agc | aag | ttc | tat | 2890 |
| Leu | Gly | Leu | Asn | Pro | Tyr | Pro | Gly | Ile | Leu | Val | Asn | Ser | Lys | Phe | Tyr | |
| | | | | 855 | | | | | 860 | | | | | 865 | | |
| aaa | ctg | gtg | aag | gat | gga | tac | caa | atg | gcc | cag | cct | gca | ttt | gcc | cca | 2938 |
| Lys | Leu | Val | Lys | Asp | Gly | Tyr | Gln | Met | Ala | Gln | Pro | Ala | Phe | Ala | Pro | |
| | | | 870 | | | | | 875 | | | | | 880 | | | |

aag aat ata tac agc atc atg cag gcc tgc tgg gcc ttg gag ccc acc 2986
Lys Asn Ile Tyr Ser Ile Met Gln Ala Cys Trp Ala Leu Glu Pro Thr
885 890 895
cac aga ccc acc ttc cag cag atc tgc tcc ttc ctt cag gag cag gcc 3034
His Arg Pro Thr Phe Gln Gln Ile Cys Ser Phe Leu Gln Glu Gln Ala
900 905 910
caa gag gac agg aga gag cgg gac tat acc aat ctg ccg agc agc agc 3082
Gln Glu Asp Arg Arg Glu Arg Asp Tyr Thr Asn Leu Pro Ser Ser Ser
915 920 925 930
aga agc ggt ggc agc ggc agc agc agc agt gag ctg gag gag gag agc 3130
Arg Ser Gly Gly Ser Gly Ser Ser Ser Ser Glu Leu Glu Glu Glu Ser
935 940 945
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Ser Ser Glu His Leu Thr Cys Cys Glu Gln Gly Asp Ile Ala Gln Pro
950 955 960
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Leu Leu Gln Pro Asn Asn Tyr Gln Phe Cys
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<211> 972
<212> PRT
<213> Homo sapiens

<400> 8

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Gly Gln Gly Ile Pro Val Ile Glu Pro Ser Val Pro Glu Leu Val Val

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| | 20 | | 25 | | 30 |
| Lys | Pro | Gly | Ala | Thr | Val |
| | 35 | | | | |
| | | | | Thr | Leu |
| | | | | 40 | Arg |
| | | | | | Cys |
| | | | | | Val |
| | | | | | Gly |
| | | | | | Asn |
| | | | | | 45 |
| | | | | | Gly |
| | | | | | Ser |
| | | | | | Val |
| | | | | | |
| Glu | Trp | Asp | Gly | Pro | Pro |
| | 50 | | | | |
| | | | | Ser | Pro |
| | | | | 55 | His |
| | | | | | Trp |
| | | | | | Thr |
| | | | | | Leu |
| | | | | | 60 |
| | | | | | Tyr |
| | | | | | Ser |
| | | | | | Asp |
| | | | | | Gly |
| | | | | | |
| Ser | Ser | Ser | Ile | Leu | Ser |
| | | | | 70 | Thr |
| | | | | | Asn |
| | | | | | Asn |
| | | | | | Ala |
| | | | | | Thr |
| | | | | | 75 |
| | | | | | Phe |
| | | | | | Gln |
| | | | | | Asn |
| | | | | | Thr |
| | | | | | 80 |
| | | | | | Gly |
| | | | | | |
| Thr | Tyr | Arg | Cys | Thr | Glu |
| | | | | 85 | Pro |
| | | | | | Gly |
| | | | | | Asp |
| | | | | | Pro |
| | | | | | 90 |
| | | | | | Leu |
| | | | | | Gly |
| | | | | | Gly |
| | | | | | Ser |
| | | | | | Ala |
| | | | | | 95 |
| | | | | | Ala |
| | | | | | |
| Ile | His | Leu | Tyr | Val | Lys |
| | | | | 100 | Asp |
| | | | | | Pro |
| | | | | | Ala |
| | | | | | 105 |
| | | | | | Arg |
| | | | | | Pro |
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| | | | | | Asn |
| | | | | | Val |
| | | | | | 110 |
| | | | | | Leu |
| | | | | | Ala |
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| Gln | Glu | Val | Val | Val | Phe |
| | | | | | 115 |
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| | | | | | Asp |
| | | | | | 120 |
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| | | | | | Asp |
| | | | | | Ala |
| | | | | | Leu |
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| | | | | | Pro |
| | | | | | Cys |
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| Leu | Thr | Asp | Pro | Val | Leu |
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| Gly | Arg | Pro | Leu | Met | Arg |
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| | | | | | Thr |
| | | | | | Asn |
| | | | | | Tyr |
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| | | | | | Phe |
| | | | | | Ser |
| | | | | | Pro |
| | | | | | Trp |
| | | | | | His |
| | | | | | 160 |
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| Gly | Phe | Thr | Ile | His | Arg |
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| Cys | Ser | Ala | Leu | Met | Gly |
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| | | | | | Arg |
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| | | | | | Val |
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| | | | | | Ser |
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| | | | | | Arg |
| | | | | | |
| Leu | Lys | Val | Gln | Lys | Val |
| | | | | | 195 |
| | | | | | Ile |
| | | | | | Pro |
| | | | | | 200 |
| | | | | | Gly |
| | | | | | Pro |
| | | | | | Pro |
| | | | | | Ala |
| | | | | | Leu |
| | | | | | 205 |
| | | | | | Thr |
| | | | | | Leu |
| | | | | | Val |
| | | | | | |
| Pro | Ala | Glu | Leu | Val | Arg |
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| | | | | | Ala |
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| | | | | | Cys |
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| | | | | | Leu |
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| | | | | | His |
| | | | | | Asn |
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| Asn | Thr | Lys | Leu | Ala | Ile |
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| | | | | | Asp |
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| | | | | | His |
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| | | | | | Asn |
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| Tyr | Gln | Lys | Val | Leu | Thr |
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| | | | | | Leu |
| | | | | | Asn |
| | | | | | Leu |
| | | | | | Asp |
| | | | | | Gln |
| | | | | | Val |
| | | | | | Asp |
| | | | | | Phe |
| | | | | | Gln |
| | | | | | His |
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Ala Gly Asn Tyr Ser Cys Val Ala Ser Asn Val Gln Gly Lys His Ser
275 280 285

Thr Ser Met Phe Phe Arg Val Val Glu Ser Ala Tyr Leu Asn Leu Ser
290 295 300

Ser Glu Gln Asn Leu Ile Gln Glu Val Thr Val Gly Glu Gly Leu Asn
305 310 315 320

Leu Lys Val Met Val Glu Ala Tyr Pro Gly Leu Gln Gly Phe Asn Trp
325 330 335

Thr Tyr Leu Gly Pro Phe Ser Asp His Gln Pro Glu Pro Lys Leu Ala
340 345 350

Asn Ala Thr Thr Lys Asp Thr Tyr Arg His Thr Phe Thr Leu Ser Leu
355 360 365

Pro Arg Leu Lys Pro Ser Glu Ala Gly Arg Tyr Ser Phe Leu Ala Arg
370 375 380

Asn Pro Gly Gly Trp Arg Ala Leu Thr Phe Glu Leu Thr Leu Arg Tyr
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Pro Pro Glu Val Ser Val Ile Trp Thr Phe Ile Asn Gly Ser Gly Thr
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Leu Leu Cys Ala Ala Ser Gly Tyr Pro Gln Pro Asn Val Thr Trp Leu
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Gln Cys Ser Gly His Thr Asp Arg Cys Asp Glu Ala Gln Val Leu Gln
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Val Trp Asp Asp Pro Tyr Pro Glu Val Leu Ser Gln Glu Pro Phe His
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Lys Val Thr Val Gln Ser Leu Leu Thr Val Glu Thr Leu Glu His Asn
465 470 475 480

Gln Thr Tyr Glu Cys Arg Ala His Asn Ser Val Gly Ser Gly Ser Trp
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Ala Phe Ile Pro Ile Ser Ala Gly Ala His Thr His Pro Pro Asp Glu
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Phe Leu Phe Thr Pro Val Val Val Ala Cys Met Ser Ile Met Ala Leu
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Leu Leu Leu Leu Leu Leu Leu Leu Tyr Lys Tyr Lys Gln Lys Pro
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Lys Tyr Gln Val Arg Trp Lys Ile Ile Glu Ser Tyr Glu Gly Asn Ser
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Tyr Thr Phe Ile Asp Pro Thr Gln Leu Pro Tyr Asn Glu Lys Trp Glu
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Phe Pro Arg Asn Asn Leu Gln Phe Gly Lys Thr Leu Gly Ala Gly Ala
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Phe Gly Lys Val Val Glu Ala Thr Ala Phe Gly Leu Gly Lys Glu Asp
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Ala Val Leu Lys Val Ala Val Lys Met Leu Lys Ser Thr Ala His Ala
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Asp Glu Lys Glu Ala Leu Met Ser Glu Leu Lys Ile Met Ser His Leu
 625 630 635 640

Gly Gln His Glu Asn Ile Val Asn Leu Leu Gly Ala Cys Thr His Gly
 645 650 655

Gly Pro Val Leu Val Ile Thr Glu Tyr Cys Cys Tyr Gly Asp Leu Leu
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Asn Phe Leu Arg Arg Lys Ala Glu Ala Met Leu Gly Pro Ser Leu Ser
 675 680 685

Pro Gly Gln Asp Pro Glu Gly Gly Val Asp Tyr Lys Asn Ile His Leu
 690 695 700

Glu Lys Lys Tyr Val Arg Arg Asp Ser Gly Phe Ser Ser Gln Gly Val
 705 710 715 720

Asp Thr Tyr Val Glu Met Arg Pro Val Ser Thr Ser Ser Asn Asp Ser
 725 730 735

Phe Ser Glu Gln Asp Leu Asp Lys Glu Asp Gly Arg Pro Leu Glu Leu
 740 745 750

Arg Asp Leu Leu His Phe Ser Ser Gln Val Ala Gln Gly Met Ala Phe
 755 760 765

Leu Ala Ser Lys Asn Cys Ile His Arg Asp Val Ala Ala Arg Asn Val
 770 775 780

Leu Leu Thr Asn Gly His Val Ala Lys Ile Gly Asp Phe Gly Leu Ala
 785 790 795 800

Arg Asp Ile Met Asn Asp Ser Asn Tyr Ile Val Lys Gly Asn Ala Arg
 805 810 815

Leu Pro Val Lys Trp Met Ala Pro Glu Ser Ile Phe Asp Cys Val Tyr
 820 825 830

Thr Val Gln Ser Asp Val Trp Ser Tyr Gly Ile Leu Leu Trp Glu Ile
 835 840 845

Phe Ser Leu Gly Leu Asn Pro Tyr Pro Gly Ile Leu Val Asn Ser Lys
 850 855 860

Phe Tyr Lys Leu Val Lys Asp Gly Tyr Gln Met Ala Gln Pro Ala Phe
 865 870 875 880

Ala Pro Lys Asn Ile Tyr Ser Ile Met Gln Ala Cys Trp Ala Leu Glu
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Pro Thr His Arg Pro Thr Phe Gln Gln Ile Cys Ser Phe Leu Gln Glu
 900 905 910

Gln Ala Gln Glu Asp Arg Arg Glu Arg Asp Tyr Thr Asn Leu Pro Ser
 915 920 925

Ser Ser Arg Ser Gly Gly Ser Gly Ser Ser Ser Ser Glu Leu Glu Glu
 930 935 940

Glu Ser Ser Ser Glu His Leu Thr Cys Cys Glu Gln Gly Asp Ile Ala
 945 950 955 960

Gln Pro Leu Leu Gln Pro Asn Asn Tyr Gln Phe Cys
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